EPC STORMWATER REVIEW COMMENTS
IN ORANGE BOXES WITH BLACK TEXT

BARGHAUSEN

04/10/2024

Drainage Report

Dutch Bros Coffee (CO0907)

PREPARED BY
Barghausen Consulting Engineers, Inc.

PREPARED FOR
Dutch Bros Coffee

CLIENT ADDRESS
110 S.W. 4th Street, Grants Pass, OR 97526

SITE ADDRESS	PROJECT NO.	DATE	JURISDICTION
5810 Omaha Boulevard, Colorado Springs, Colorado 80915	23098 PPR2413	04/10/2024	City of Colorado Springs El Paso County

This drainage report is very brief. See Chapter 4 of the El Paso County DCM Volume 1 for the required components for the drainage report.

El Paso County Signature blocks have been added in place of the City signature blocks

ENGINEER'S STATEMENT:

Design Engineer's Statement:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

_____ _____
[Name, P.E. #_____] Date

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Anthony E. Merlino, PE#60820

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DEVELOPER'S STATEMENT:

04/10/2024

Dutch Bros LLC hereby certifies that the drainage facilities for **Dutch Bros CO0907** shall be

Owner/Developer's Statement:

I, the owner/developer have read and will comply with all of the requirements specified in this drainage report and plan.

_____ _____
[Name, Title] Date
[Business Name]
[Address]

Colorado
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Title:_____ Address: _____

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_____

El Paso County:

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

_____ _____
Joshua Palmer, P.E. Date
County Engineer / ECM Administrator

Conditions:

ngs} 2001, as

WATR Conformance

PROJECT OVERVIEW

What does this mean? What predetermined storm basin requirements? The proposed redevelopment will need to follow all El Paso County Standards.

This document is the Drainage Report for 5810 Omaha Boulevard, Colorado Springs, CO 80915. This report is intended to demonstrate that the drainage requirements for the proposed Dutch Bros. Coffee development is in conformance with the predetermined storm basin requirements for the existing commercial development.

This project is located in the northwest corner of Powers Boulevard and Omaha Boulevard, Colorado Springs, Colorado and is currently an existing gas station. The parcel is approximately 0.62± ac or 26,869± square feet and is bounded by Powers Boulevard to the west, existing commercial development on the east and north, and Omaha Boulevard to the south. The disturbed area consists of approximately 0.62± ac or 26,869± square feet. Overall, the site slopes from the northeast to the southwest. Refer to Appendix A for the Vicinity Map.

The property is zoned as Commercial Regional. The proposed development includes a building footprint of 950 square feet and a 272-square-foot trash enclosure. The planned site improvements include paved asphalt driving area, reinforced concrete driving area, on-site sidewalk area, and landscaping. These values give the site an overall impervious percentage of approximately 59%±.

SOILS

Per the Natural Resources Conservation Service web soils survey, soils for this project, delineated on the Soils Map within Appendix B of this report, are classified as Blendon Sandy Loam. Blendon Sandy Loam has been classified as Hydrologic Soil Type “B”. The study area consists of undeveloped land with sparse, grassy vegetation.

FLOODPLAN STATEMENT

The subject property is located in Zone “X” (Area determined to be outside the 0.2% annual chance floodplain) per the Flood Insurance Rate Map for County of El Paso, Colorado Map Number 08041C0751G, revised December 7, 2018.

EXISTING DRAINAGE

Discuss in more detail, how many inlets? What size storm drains etc.

The existing site is currently an existing gas station with existing drainage inlets near the south side of the site. There is an existing storm drain system located near the south end of the site. In general, the site typically sheet flows from the northeast to the southwest towards the existing inlets. Refer to Appendix B for the Existing Conditions Drainage Map.

In existing conditions, Basin A-1 is approximately 0.62 acres in size and approximately 90% impervious. The runoff coefficient for the 5-year and 100-year storm event is 0.81 and 0.88, respectively. The flow rate was calculated using a minimum time of concentration of 5 minutes. The runoff is approximately 2.61 cfs for the 5-year and 4.76 cfs for the 100-year storm event. The runoff is conveyed and collected by the existing drainage inlets located near the south end of the site and is conveyed to the existing storm drain.

In the above paragraph inlets is plural. The basins for the project site should have one discharge point each. If there are multiple inlets there should be multiple sub-basins.

Ensure that these values are based on DCM table 5-1

PROPOSED DRAINAGE

The project proposes to construct a new Dutch Bros Coffee building, drive aisles, parking stalls, landscaping, and utilities. In proposed conditions, the project proposes more landscaping than existing conditions, which reduces the amount of runoff to the tributary drainage inlets.

In proposed conditions, Basin A-1 is the proposed Dutch Bros Coffee site. The basin is approximately 0.63 acres in size and approximately 73% impervious. The runoff coefficient for the 5-year and 100-year storm event is 0.68 and 0.80, respectively. The flow rate was calculated using a minimum time of concentration of 5 minutes. The runoff is approximately 2.22 cfs for the 5-year and 4.35 cfs for the 100-year storm event, which is less than the existing conditions. The runoff is conveyed to curb cuts, is collected by the drainage inlets located near the south end of the site, and is conveyed to the existing storm drain.

Refer to Appendix B for the Proposed Conditions Drainage Map and Appendix C for the Hydrology Calculations for Basin A-1.

Ensure that these values are based on DCM table 5-1

SUMMARY

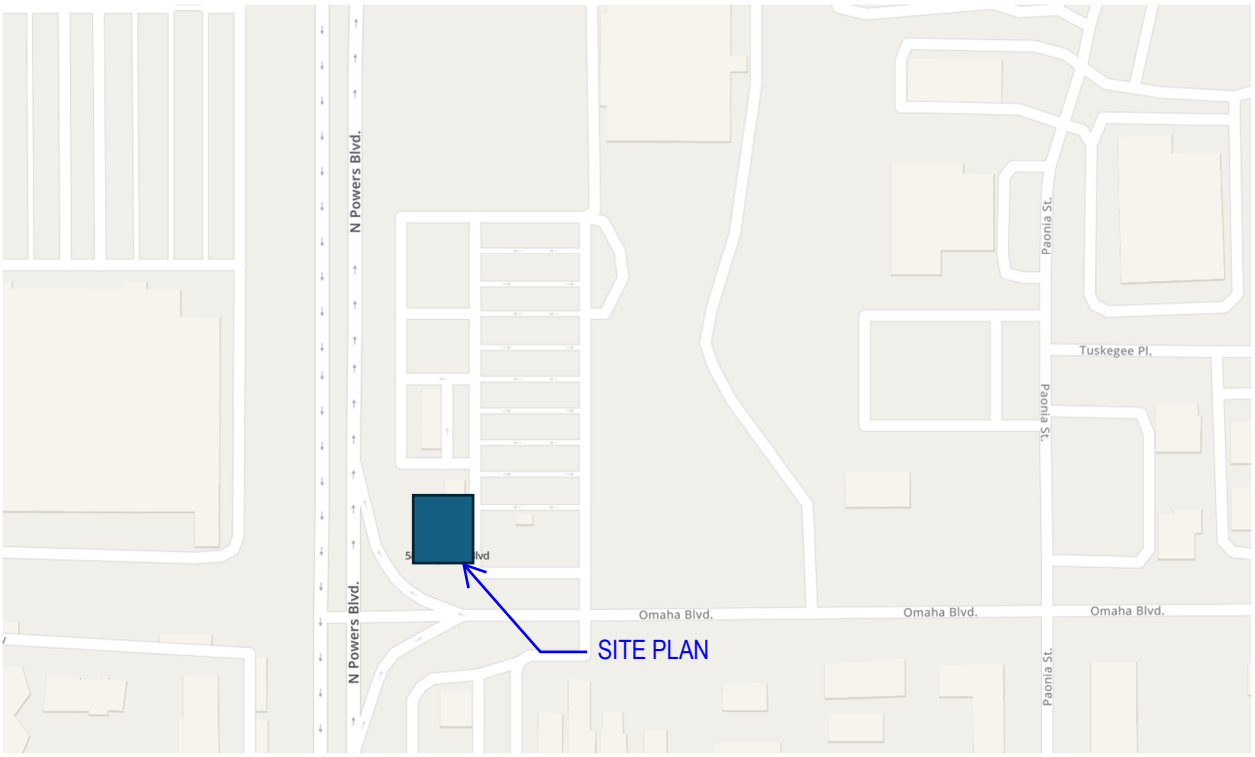
It has been concluded that the proposed project and the constructed improvements will maintain the thresholds of the existing conditions. The proposed project is less than one (1) acre in size, reduces the amount of the existing impervious area from 90% impervious to 73% impervious, and reduces the amount of runoff from 2.61 cfs to 2.22 cfs for the 5-year storm event and from 4.76 cfs to 4.35 cfs for the 100-year storm event. The proposed site also maintains the existing drainage patterns; because the site reduces the amount of runoff tributary to the existing inlets, the existing storm drains/appurtenances will not adversely affect the downstream and surrounding developments. Therefore, the proposed site is in conformance with the City of Colorado Springs and El Paso County standards and requirements.

Water quality/exemption from water quality needs to be discussed in the report.

Provide hydraulic calculations for proposed drainage features and how they will interact with existing drainage features. Ensure modifications to the site are hydraulically working with no negative impacts. See comments on the drainage map.

APPENDIX A

VICINITY MAP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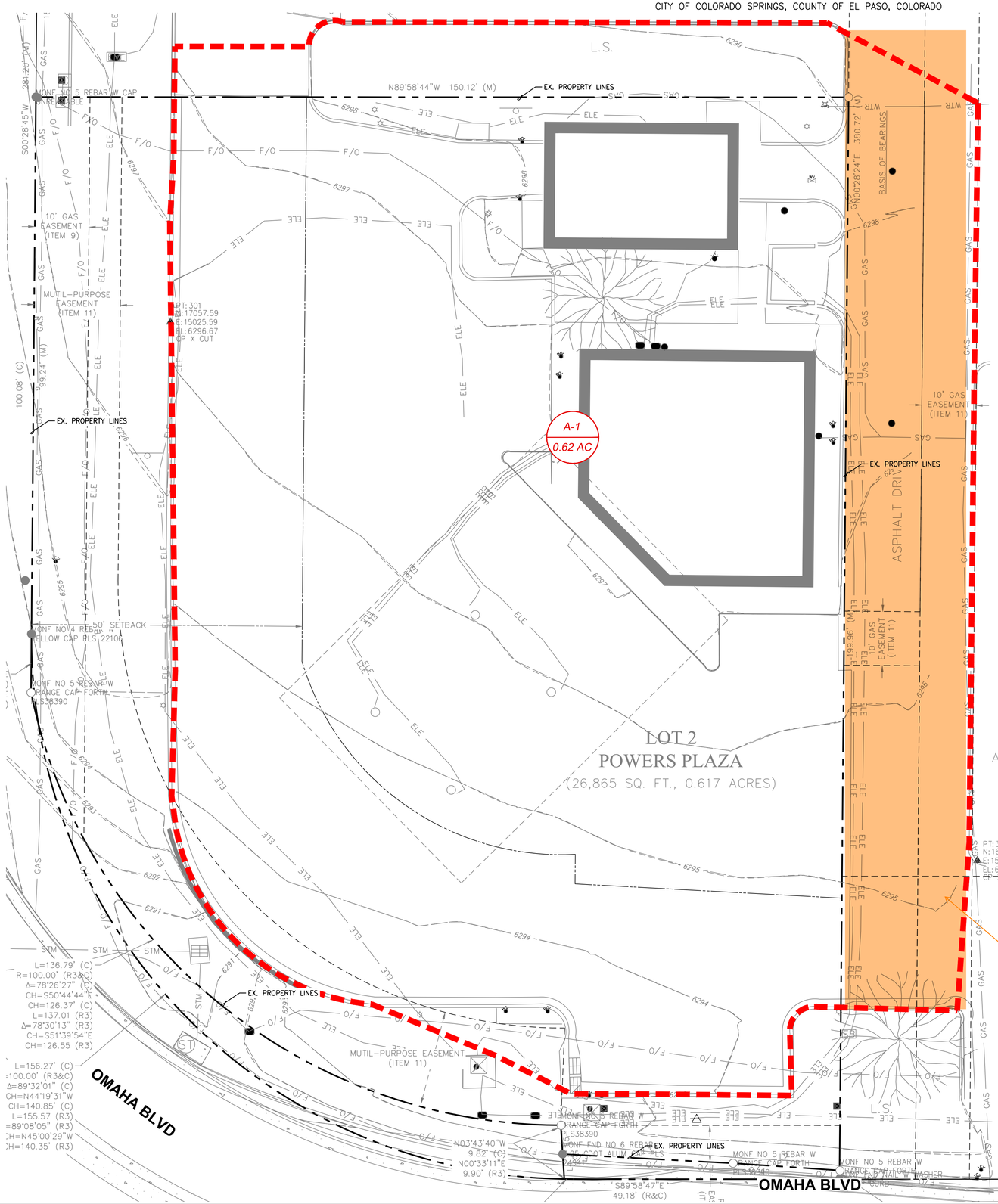
Tuskegee Pl.
Paonia St.
Omaha Blvd.
Omaha Blvd.
Omaha Blvd.
Paonia St.
SITE PLAN

APPENDIX B

- **EXISTING CONDITIONS DRAINAGE MAP**
- **PROPOSED CONDITIONS DRAINAGE MAP**

DUTCH BROS. COFFEE - CO0907, COLORADO SPRINGS, CO

A PORTION OF THE SOUTHWEST QUARTER OF SECTION 6 TOWNSHIP 14 SOUTH, RANGE 65 WEST OF THE 6TH PM
CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, COLORADO



DRAINAGE SUMMARY TABLE

EXISTING CONDITIONS								
BASIN	**AREA**	**RUNOFF (c)**	**TC (min)**	**i (2-YR) (in/hr)**	**PEAK Q_2(cfs)**	**Tc (min)**	**i (2-YR) (in/hr)**	**1 HR Q_2(cfs)**
A-1	27,124 SF (0.62 AC)	0.80	5	4.12	2.05	60	1.16	0.58
BASIN	**AREA**	**RUNOFF (c)**	**TC (min)**	**i (5-YR) (in/hr)**	**PEAK Q_5(cfs)**	**Tc (min)**	**i (5-YR) (in/hr)**	**1 HR Q_5(cfs)**
A-1	27,124 SF (0.62 AC)	0.81	5	5.17	2.62	60	1.44	0.73
BASIN	**AREA**	**RUNOFF (c)**	**TC (min)**	**i (100-YR) (in/hr)**	**PEAK Q_{100}(cfs)**	**Tc (min)**	**i (100-YR) (in/hr)**	**1 HR Q_{100}(cfs)**
A-1	27,124 SF (0.62 AC)	0.90	5	8.68	4.85	60	2.42	1.35

This column is the second Tc column and 60 minutes is an unreasonable Tc for the site. What Tc was actually used?

Does this section of the road drain to those inlets? If not, there should be multiple basins for each design point.

No.	Date	By	Ckd.	Appr.	Revision

Title: **PROPOSED DRAINAGE PLAN**
5810 OMAHA BLVD
COLORADO SPRINGS, CO 80915

DUTCH BROS

For:

COLORADO LICENSED ANTHONY E. MILLER 60822 PROFESSIONAL ENGINEER
Not for Construction

Scale: Horizontal 1" = 10' Vertical N/A

Designed EMM
Drawn EMM
Checked AEM
Approved AEM
Date 04/09/24

Barghausen Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222 barghausen.com

Job Number 23098

Sheet 1 OF 1

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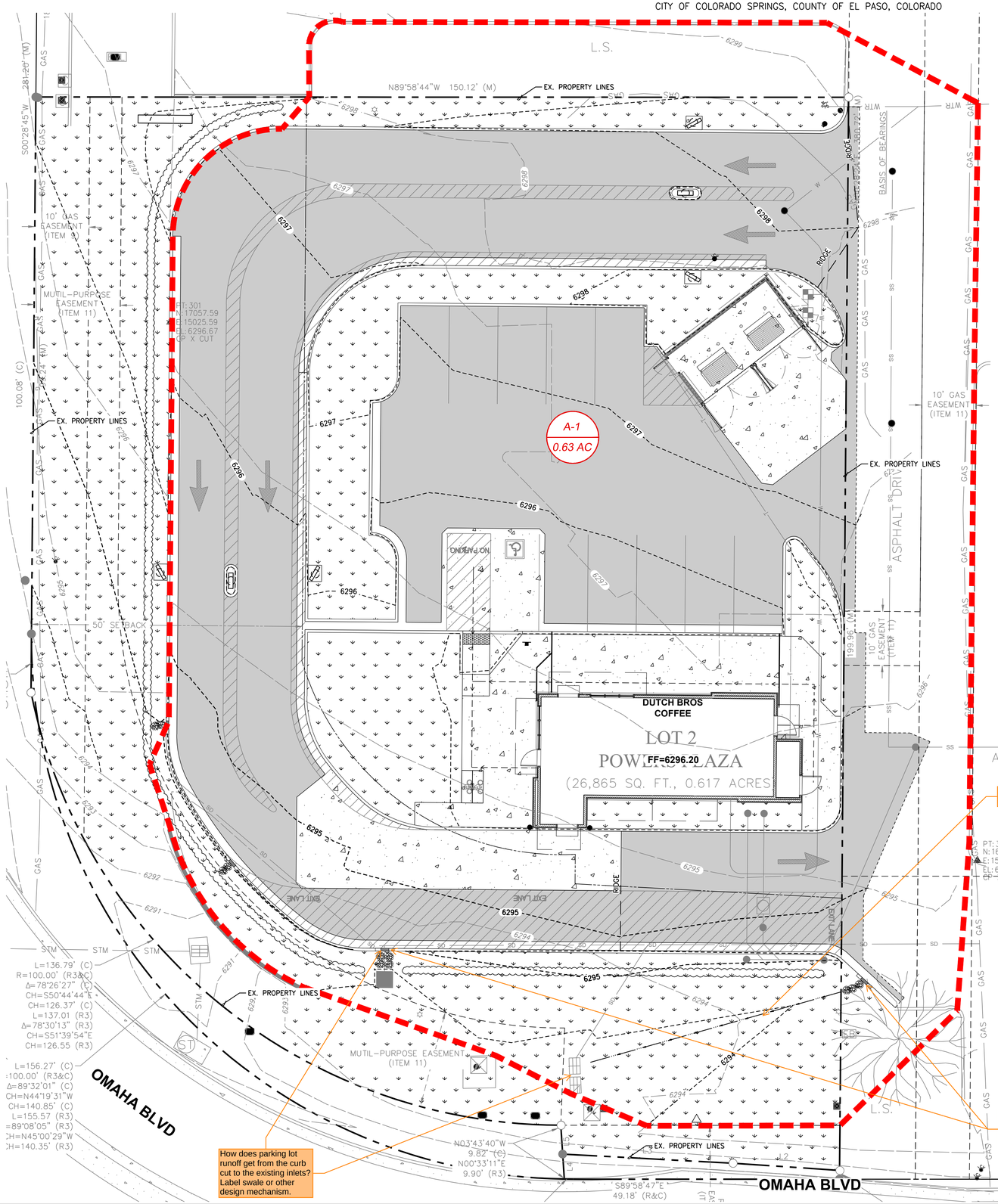
DUTCH BROS. COFFEE - CO0907, COLORADO SPRINGS, CO

A PORTION OF THE SOUTHWEST QUARTER OF SECTION 6 TOWNSHIP 14 SOUTH, RANGE 65 WEST OF THE 6TH PM
CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, COLORADO



DRAINAGE SUMMARY TABLE

PROPOSED CONDITIONS								
BASIN	AREA	RUNOFF (c)	TC (min)	i (2-YR) (in/hr)	PEAK Q_2(cfs)	Tc (min)	i (2-YR) (in/hr)	1 HR Q_2(cfs)
A-1	27,405 SF (0.63 AC)	0.66	5	4.12	1.71	60	0.48	0.58
BASIN	AREA	RUNOFF (c)	TC (min)	i (5-YR) (in/hr)	PEAK Q_5(cfs)	Tc (min)	i (5-YR) (in/hr)	1 HR Q_5(cfs)
A-1	27,405 SF (0.63 AC)	0.68	5	5.17	2.22	60	0.62	0.73
BASIN	AREA	RUNOFF (c)	TC (min)	i (100-YR) (in/hr)	PEAK Q_{100}(cfs)	Tc (min)	i (100-YR) (in/hr)	1 HR Q_{100}(cfs)
A-1	27,405 SF (0.63 AC)	0.80	5	8.68	4.35	60	1.21	1.34

This column is the second Tc column and 60 minutes is an unreasonable Tc for the site. What Tc was actually used?

Provide calculations for this swale sizing.

What is the bypass at each of these curb cuts? Provide calculations. If not all of the flow is making it to the existing inlets this needs to be discussed.

How does parking lot runoff get from the curb cut to the existing inlets? Label swale or other design mechanism.

No.	Date	By	Ckd.	Appr.	Revision

Title: PROPOSED DRAINAGE PLAN
5810 OMAHA BLVD
COLORADO SPRINGS, CO 80915

For: DUTCH BROS

COLORADO LICENSED
ANTHONY E. MIGUEL
30820
PROFESSIONAL ENGINEER
Not for Construction

Scale: Horizontal 1" = 10' Vertical N/A

Designed EMM
Drawn EMM
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Approved AEM
Date 04/08/24

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Job Number 23098
Sheet 1 OF 1

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APPENDIX C

HYDROLOGY CALCULATIONS

Project: Dutch Bros - CO0907
Location: 5810 Omaha Blvd, Colorado Springs, CO
BCE# 23098

Rational Method

EXISTING

Basin:	**A-1**
Total Area (sf)	**27,124**
Total Area (ac)	0.62
Impervious Area (sf)	24,308
Pervious Area (sf)	2,816
Total Area (sf)	**27,124**
%Impervious (i)	**0.90**

Runoff Coefficient, c **(per Table 6-6 Runoff Coefficient - Commercial)**
Soil Type **B** **(per NRCS Web Soil Survey)**

	2 YR	5 YR	100 YR
Impervious	0.89	0.9	0.96
Pervious	0.02	0.08	0.35

	A-1
2 Year	0.79
5 Year	0.81
100 year	0.88

Rainfall Intensity, i (in/hr) **(per Figure 6-5 - Colorado Springs Rainfall Intensity Duration Frequency)**

	5 (min)	60 (min)
i2 (in/hr) =	4.12	1.16
i5 (in/hr) =	5.17	1.44
i100 (in/hr) =	8.68	2.42

Runoff, Q (cfs), assume min Tc = 5 min **Q = C * i * A**

	A-1
Q2 (cfs) =	2.03
Q5 (cfs) =	2.61
Q100 (cfs) =	4.76

Runoff, Q (cfs), assume min Tc = 1 hr **Q = C * i * A**

	A-1
Q2 (cfs) =	0.57
Q5 (cfs) =	0.73
Q100 (cfs) =	1.32

Drainage maps show different Tc

Project: Dutch Bros - CO0907
Location: 5810 Omaha Blvd, Colorado Springs, CO
BCE# 23098

Rational Method

PROPOSED

Basin:	**A-1**
Total Area (sf)	**27,405**
Total Area (ac)	0.63
Impervious Area (sf)	20,095
Pervious Area (sf)	7,310
Total Area (sf)	**27,405**
%Impervious (i)	**0.73**

Runoff Coefficient, c **(per Table 6-6 Runoff Coefficient - Commercial)**
Soil Type **B** **(per NRCS Web Soil Survey)**

	2 YR	5 YR	100 YR
Impervious	0.89	0.9	0.96
Pervious	0.02	0.08	0.35

	A-1
2 Year	0.66
5 Year	0.68
100 year	0.80

Rainfall Intensity, i (in/hr) **(per Figure 6-5 - Colorado Springs Rainfall Intensity Duration Frequency)**

	5 (min)	60 (min)
i2 (in/hr) =	4.12	1.16
i5 (in/hr) =	5.17	1.44
i100 (in/hr) =	8.68	2.42

Runoff, Q (cfs), assume min Tc = 5 min **Q = C * i * A**

	A-1
Q2 (cfs) =	1.71
Q5 (cfs) =	2.22
Q100 (cfs) =	4.35

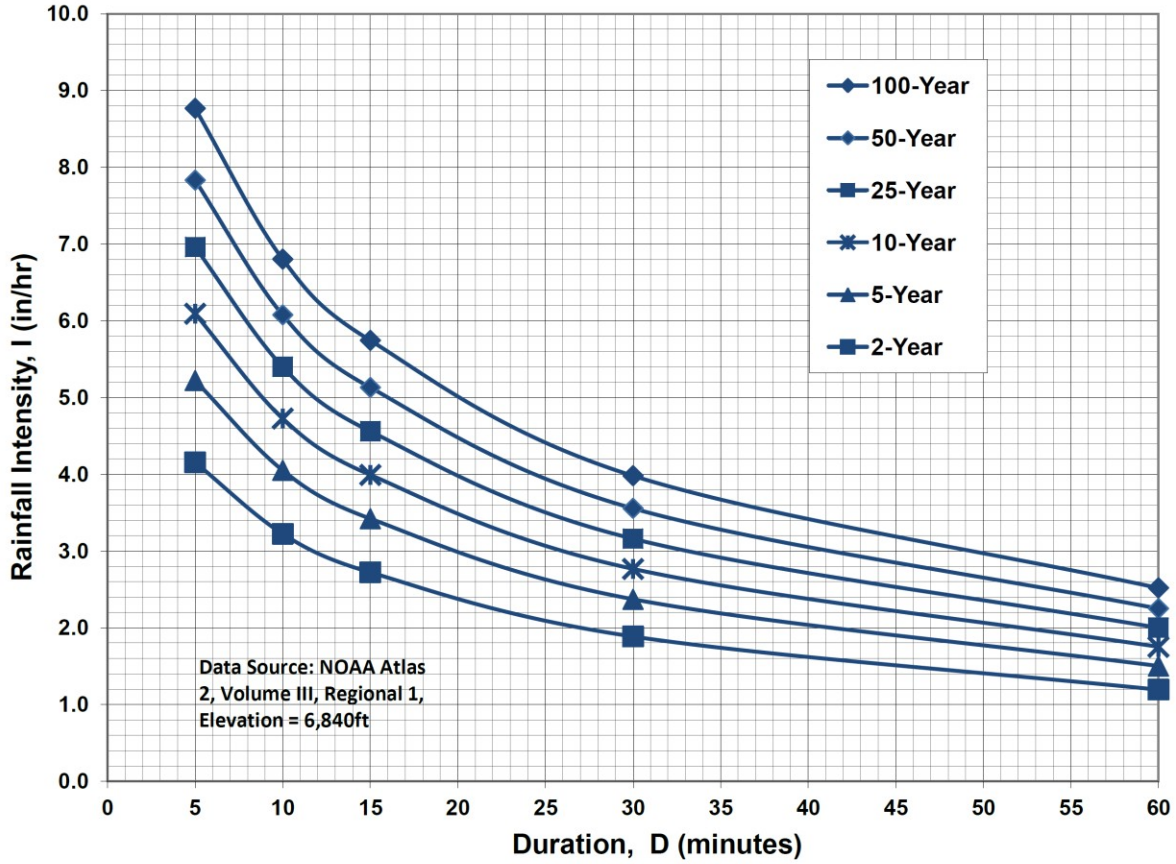
Runoff, Q (cfs), assume min Tc = 1 hr **Q = C * i * A**

	A-1
Q2 (cfs) =	0.48
Q5 (cfs) =	0.62
Q100 (cfs) =	1.21

APPENDIX D

REFERENCES

Figure 6-5. Colorado Springs Rainfall Intensity Duration Frequency



IDF Equations

$I_{100} = -2.52 \ln(D) + 12.735$

$I_{50} = -2.25 \ln(D) + 11.375$

$I_{25} = -2.00 \ln(D) + 10.111$

$I_{10} = -1.75 \ln(D) + 8.847$

$I_{5} = -1.50 \ln(D) + 7.583$

$I_{2} = -1.19 \ln(D) + 6.035$

Note: Values calculated by equations may not precisely duplicate values read from figure.

Please use DCM table 5-1 for runoff coefficients

Table 6-6. Runoff Coefficients for Rational Method
(Source: UDFCD 2001)

Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.87	0.87	0.88	0.88	0.89
Neighborhood Areas	70	0.45	0.49	0.49	0.53	0.53	0.57	0.58	0.62	0.60	0.65	0.62	0.68
Residential													
1/8 Acre or less	65	0.41	0.45	0.45	0.49	0.49	0.54	0.54	0.59	0.57	0.62	0.59	0.65
1/4 Acre	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
1/3 Acre	30	0.18	0.22	0.25	0.30	0.32	0.38	0.39	0.47	0.43	0.52	0.47	0.57
1/2 Acre	25	0.15	0.20	0.22	0.28	0.30	0.36	0.37	0.46	0.41	0.51	0.46	0.56
1 Acre	20	0.12	0.17	0.20	0.26	0.27	0.34	0.35	0.44	0.40	0.50	0.44	0.55
Industrial													
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Parks and Cemeteries	7	0.05	0.09	0.12	0.19	0.20	0.29	0.30	0.40	0.34	0.46	0.39	0.52
Playgrounds	13	0.07	0.13	0.16	0.23	0.24	0.31	0.32	0.42	0.37	0.48	0.41	0.54
Railroad Yard Areas	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
Undeveloped Areas													
Historic Flow Analysis--Greenbelts, Agriculture	2	0.03	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59
Streets													
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Drive and Walks	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Roofs	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Lawns	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

3.2 Time of Concentration

One of the basic assumptions underlying the Rational Method is that runoff is a function of the average rainfall rate during the time required for water to flow from the hydraulically most remote part of the drainage area under consideration to the design point. However, in practice, the time of concentration can be an empirical value that results in reasonable and acceptable peak flow calculations.

For urban areas, the time of concentration (t_c) consists of an initial time or overland flow time (t_i) plus the travel time (t_t) in the storm sewer, paved gutter, roadside drainage ditch, or drainage channel. For non-urban areas, the time of concentration consists of an overland flow time (t_i) plus the time of travel in a concentrated form, such as a swale or drainageway. The travel portion (t_t) of the time of concentration can be estimated from the hydraulic properties of the storm sewer, gutter, swale, ditch, or drainageway. Initial time, on the other hand, will vary with surface slope, depression storage, surface cover, antecedent rainfall, and infiltration capacity of the soil, as well as distance of surface flow. The time of concentration is represented by Equation 6-7 for both urban and non-urban areas.